

# Administrator's Column

(In this column NASA Activities features an article by NASA Administrator James M. Beggs. These articles focus on subjects chosen by him that address topics of broad interest to the agency's employees. The column this month features an address presented at NASA's Marshall Space Flight Center, Huntsville, Alabama.)



## Quality Improvement and Greater Productivity

We are nearing the end of what was once called "The American Century." During most of the century, the United States' economic preeminence in the world seemed assured.

And, as recently as 2 decades ago, that, indeed, appeared to be true.

But centuries, like light bulbs, do not seem to last as long as they once did. In recent years, we have learned that for the rest of the American century and beyond, our economic leadership is by no means assured. In an incredibly few years, while most of us fell asleep at the wheel, others were wide awake. They took our technology and moved it into marketable products faster than we could. And when we finally opened our eyes, others had passed us by — in areas we once considered our own special domain.

One by one, basic industries and manufacturing industries began to feel the lash of foreign competition. Today, scores of American industries, ranging from steel to electronics, are fighting hard to stay alive.

And even as we strive to return America to excellence and to the competitive position we enjoyed just a few years ago, other symptoms of our competitive decline are all around us.

The record United States trade deficit for 1984, more than \$123 billion, is but one symptom of the problem.

Trade accounts for a critical share of our GNP. It is true that the high value of the dollar in currency exchange markets has helped to erode the markets for American-made goods. But that still does not fully account for the fact the import share of our domestic

market for manufactured goods is growing. In 1982, for example, imports won 14 percent of the domestic market. Last year that grew to 22 percent.

Though we still lead our competitors in high technology exports — things like business machines, scientific equipment and electronic machinery — our companies are maintaining their sales abroad at the cost of dwindling profitability. Many industries are considering building plants abroad so they might compete on a more equal footing with their foreign competitors. This would mean a loss of jobs in the United States, a development we could ill afford.

There are other symptoms of our competitive decline. Since the mid-1960s, our investment in research and development in proportion to our GNP has dropped sharply, while that of other major industrialized nations has increased.

And we lag behind our competitors in turning out scientists and engineers, professionals crucial to technological progress. Engineering and science account for only 20 percent of all bachelors' degrees earned in the United States. This compares with 25 percent of all such degrees in Japan; 34 percent in West Germany and more than 50 percent in the Soviet Union.

But the real keystone of economic vitality is productivity growth. Here our annual growth rates, while advancing at about 3 percent, still do not measure up to Japan's 6 percent, for example, or to West Germany's 4.5 percent or to France's 4 percent. Unless we can maintain a productivity growth rate that is competitive worldwide for the long term, we will continue to lose ground to others in world markets.

Ironically, just at a time when consumer confidence and economic growth appear to be on the upswing, we find ourselves faced with a new and growing problem: the gnawing prospect of an uncertain future, based on the decline of America's competitive position in the world.

If we don't put our economic house in order today, we could face growing unemployment and lower standards tomorrow.

Clearly, improvements in productivity and quality are fundamental ingredients in helping to reinvigorate America's competitive strength.

This is a nationwide challenge. A couple of years ago we decided that NASA has a special role in helping to meet it, because for most Americans, NASA epitomizes excellence. This was brought home to me the other day when I saw an ad in the paper. The headline read: "Can you choose the copier NASA chose?" The question was followed by an array of well-known names and some relatively not-so-well-known. It concluded by urging consumers to "copy NASA" if they want the best copier for their money.

The ad did not surprise me. Indeed, for years NASA has stood for what is best about America — creativity, innovation, and a can-do spirit that demonstrates that nothing is impossible if we apply will, resolution and resources to accomplish great things. So, we decided that NASA would help get America back on the competitive track by spearheading a drive to restore national excellence through improvements in quality and productivity.

We thought the best way to do this was to try to set an example to the rest of government and to our industry and university partners by establishing our own productivity and quality improvement program.

Mark Twain once wrote, "Few things are harder to put up with than the annoyance of a good example."

Looking at it *that way*, we'll be very pleased if our program becomes a major national annoyance. And if it does, we will be proud to take the credit for helping to get American industry on the winning track again.

What we are doing reaches into every corner of the agency, and also reaches out to other government agencies and industry. Last September, with the help of the American Institute for Aeronautics and Astronautics, we held a 2-day national symposium in Washington on developing strategies for improving productivity and quality in government and industry. More than 600 government and business leaders attended. The numbers in attendance and the lively discussions convinced us that people are very concerned about these matters and are ready and willing to work at them.

We began our program 3 years ago, when we formed an executive management team to study what industry was doing to improve productivity and quality. The team visited three companies known for their innovative management practices in these areas: Westinghouse, TRW and Hewlett Packard.

Not surprisingly, we found that the three companies shared a basic management philosophy.

That philosophy reflects the notions of participative democracy. It is based on respect for the individual and a belief that decentralized decision-making and the team approach to problem-solving encourage innovation and reveal talent which otherwise might go unnoticed.

We thought this was a good and effective philosophy, so we made it our own. Our goal became to motivate all NASA and contractor employees, from top managers on down, to participate in improving overall agency performance. Our objective — to make every employee feel that he or she has a stake in making the system work better. Because only through participation across the board can we achieve higher quality products and greater individual and institutional pride in what we do.

In house, we have established our own version of industry Quality Circles, the concept pioneered in Japan by Dr. W. Edwards Deming and other Americans. We call our groups NETS for NASA Employee Teams. There are now 120 NETS throughout the agency, including some with contractor members. All NETS members are volunteers and the teams are composed of all classes of employees, including secretaries, blue collar workers, scientists and engineers. If any of you are involved in a NET, you know it is very democratic and that this voluntary approach to problem-solving can also be very effective.

Another tool to increase employee participation is our Employee Suggestion Program. Eleven months ago, we began a drive to revitalize the program, which had fallen into disuse after its heyday during the Apollo Program and was practically moribund by 1982.

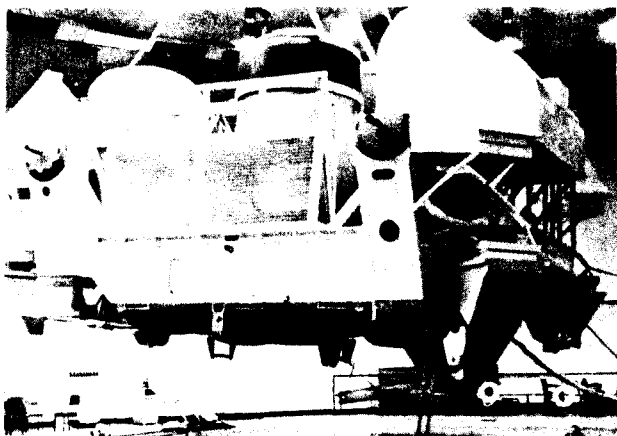
We have had extremely good results in bringing it back to life. For example, during FY 1984, we received 1,095 employee suggestions, with tangible benefits to NASA totaling more than \$3.5 million. This is 64 percent more than the 396 suggestions we got in fiscal year 1983, which resulted in savings of a little over half a million dollars.

On another front, we have been reducing unnecessary bureaucracy by cutting paperwork, decentralizing decision-making by delegating more authority to the Centers, and installing state-of-the-art office automation. These efforts have been very fruitful, resulting in administrative time-savings in the lead time for procurements, a 20 percent cut in the agency-wide paperwork load, and significant time and effort saved in program planning and budget preparation.

Throughout the agency, 90 cents of every dollar we spend is spent in the private sector. So our contractors have, of course, been brought into this effort.

We have established a NASA-Contractor Productivity Council to zero in on the NASA-Contractor relationship and to study ways we can reduce or eliminate obstacles to productivity and quality improvement. Participation in the Council has been very encouraging. More than 200 people from industry and our centers met last April to discuss areas of emphasis. And they plan to meet again to review progress.

We are very serious about our Contractor Council's work. To make it easier for contractors to do their job, we look to them for suggestions on how the contract should be structured. We are looking at potential incentives on quality and productivity that fit a particular company. And we have already changed some of our contracts to reward improvements in those areas.



A full scale model of GRO is prepared for testing.

The contract we have with TRW on the Gamma Ray Observatory program is a good example. A joint TRW-NASA product improvement program began in July 1983. It has resulted in projected savings of more than \$2 million to date. They came to us and asked us to write a productivity incentive clause in their contract, which we did. And they are doing a good job on it. Right now, they are ahead of schedule and under budget. And if they stay that way, they will get a reward. If they don't, they will accept the penalty.

We are also developing another incentive, the NASA Excellence Award for Productivity and Quality, to recognize outstanding achievements by our contractors, subcontractors and suppliers. It will be self-nominating, and won't be limited to only one company a year. Under it, every employee in the plant, from top managers on down, will be recognized.

I can tell you that it will be very difficult to pick the winners. We have had a slew of excellent nominees for the first awards, which will be in January 1986.

We also are working on ways to bring the university community into this entire effort, and hope to do so soon.

The success of NASA's programs is well-documented. But, as Shakespeare once wrote: "No perfection is so absolute, that some impurity doth not pollute."

Quality performance is our litmus test. We aim to get rid of shoddy workmanship, defective materials, inadequate quality control, cost overruns and all of the other things that are counter-productive and hurt the program. The Management Development Program here and at our other centers will help us do this. So will our new thrust for quality improvement and greater productivity.

I am confident that we will meet our goals. And when we do, both NASA and the nation will be the winners.

Clearly, we live at a time when the public has grown impatient with government, a time when government officials can no longer afford to be patient with outmoded procedures and shoddy workmanship.

Thomas Jefferson once put it this way: "Laws and institutions must go hand in hand with the progress of the human mind . . . As new discoveries are made, new truths disclosed, and manners and opinions change with the change of circumstances, institutions must advance also, and keep pace with the times."

"Institutions must advance," Jefferson and his associates saw that point clearly in the late 18th century. And the fruit of their vision was a new nation.

It is now for us to match their vision with ours. Our task is to reinvigorate our nation so that we remain at the pinnacle of economic leadership.

Your continuing initiative, dedication and commitment will be crucial to that task.

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## Laser System Developed to Clean Clogged Arteries

NASA scientists have adopted a laser originally designed to measure gases in the atmosphere to the task of cleaning out clogged arteries without harming the walls of the blood vessels. The technique, when perfected, could allow patients to avoid coronary bypass surgery.

Physicians at Los Angeles' Cedars-Sinai Medical Center and laser scientists at NASA's Jet Propulsion Laboratory in Pasadena, Calif., recently teamed together to develop a laser system designed to non-surgically clean clogged arteries with unprecedented precision.

The system, called the excimer laser, someday may allow patients with arteriosclerosis to avoid coronary bypass surgery.

The excimer laser originally was developed at JPL to measure gases such as ozone in the Earth's atmosphere. Investigations into its application to medicine began a year and a half ago when Cedars-Sinai physicians Warren Grundfest, Frank Litvack and James Forrester, conducting research into the potential of lasers in cardiology, sought a more precise and cooler laser than those currently available for use in medicine.

They found such a laser in the form of the excimer, developed by a JPL laser research team of Drs. James Laudenslager, Thomas Pacala, Stuart McDermid and David Rider. Working with the Cedars-Sinai physicians and a fiber optics consultant, Dr. Tsvi Goldenberg, the JPL team refined the laser for the delicate cardiovascular